

Amendments to the Claims:

This listing of claims replaces all prior listings of claims:

Listing of Claims:

1. (Original) A system for estimating inputs and outputs of a digital transmission system, comprising:

a receiver front-end configured to receive an observed digital signal in the digital transmission system;

a forward recursion element adapted to receive the observed digital signal, and generate a first sequence of soft information by performing a forward recursion;

at least one forward channel estimator adapted to receive the observed digital signal and said first sequence of soft information, said at least one forward channel estimator operating to estimate channel parameters using said first sequence of soft information;

a backward recursion element adapted to receive the observed digital signal, and generate a second sequence of soft information by performing a backward recursion;

at least one backward channel estimator adapted to receive the observed digital signal and said second sequence of soft information, said at least one backward channel estimator operating to estimate channel parameters using said second sequence of soft information; and

a combiner configured to compute a transitional information that ties forward and backward estimates of said first and second sequences of soft information together, said combiner operating to generate soft information on the inputs and outputs

of the transmission system by combining updated first and second sequences of soft information and said transitional information.

2. (Original) The system of claim 1, wherein said forward recursion element is a Trellis-based forward operator, and said backward recursion element is a Trellis-based backward operator, where each operator generates a sequence of Trellis state soft information updates.

3. (Original) The system of claim 2, wherein each of said Trellis-based forward operator and backward operator is a min/sum operator.

4. (Original) The system of claim 3, wherein each of said min/sum operators performs min/sum operations on said sequence of Trellis state soft information updates.

5. (Original) The system of claim 4, wherein each of said min/sum operators computes soft output for the inputs and outputs defined by Trellis state transition.

6. (Original) The system of claim 5, wherein said soft output for the inputs and outputs defined by Trellis state transition is computed as min/sum of a starting state forward soft information, said Trellis state transition, an ending state backward soft information, and a binding factor.

7. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a sum/product operator.

8. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a min/product operator.

9. (Original) The system of claim 2, wherein each of said Trellis-based forward and backward operators is a max/product operator.

10. (Original) The system of claim 2, wherein each of said Trellis-based forward operator and backward operator is a min*/sum operator.

11. (Original) The system of claim 2, wherein each of said forward and backward operators includes a Kalman filter channel estimator for each Trellis state.

12. (Original) The system of claim 2, wherein each of said forward and backward operators includes a least mean-square estimator for each Trellis state.

13. (Original) The system of claim 2, wherein each of said forward and backward operators includes a non-linear estimator for each Trellis state.

14. (Original) The system of claim 13, wherein said non-linear estimator is a phase-locked loop.

15. (Original) The system of claim 2, wherein each of said forward and backward operators includes an open-loop estimator for each Trellis state.

16. (Original) A method for estimating inputs and outputs of a digital transmission system, comprising:

receiving an observed digital signal in the digital transmission system;

generating a first sequence of soft information by performing a forward recursion;

estimating channel parameters using said first sequence of soft information and said observed digital signal;

generating a second sequence of soft information by performing a backward recursion;

estimating channel parameters using said second sequence of soft information and said observed digital signal;

computing a transitional information that ties forward and backward estimates of said first and second sequences of soft information together; and

generating soft information on the inputs and outputs of the transmission system by combining updated first and second sequences of soft information and said transitional information.

17. (Currently Amended) An iterative receiver system, comprising:

a channel processor configured to receive a plurality of coded symbols, said channel processor operating to produce and update soft information on said plurality of coded symbols, where said channel processor is activated by updated soft information on interleaved code symbols and wherein said channel processor operating to produce and update soft information comprises:

generating a first sequence of soft information
by performing a forward recursion,

estimating channel parameters using said first sequence of soft information and said plurality of coded symbols,

generating a second sequence of soft information by performing a backward recursion,

estimating channel parameters using said second sequence of soft information and said plurality of coded symbols,

computing a transitional information that ties forward and backward estimates of said first and second sequences of soft information together, and

generating said soft information on said plurality of coded symbols and outputs of said channel processor by combining updated first and second sequences of soft information and said transitional information;

a soft-in/soft-out decoder configured to receive said soft-information on said plurality of coded symbols, said soft-in/soft-out decoder operating to compute soft information on said coded symbols; and

an interleaver/de-interleaver pair operating to pass said soft information to/from said channel processor from/to said soft-in/soft-out decoder,

where after several iterations, final bit decisions are made on uncoded bits by said soft-in/soft-out decoder by thresholding the corresponding soft information produced by said soft-in/soft-out decoder.